

REMARKS

Claims 1-3 and 5-19 are pending in this application. Applicants appreciate the Examiner's acceptance of the Rule 131 Declaration but note the Office indicates that the Declaration has overcome the Tanabe, et al. reference (U.S. 2004/0198067). As the Tanabe, et al. reference is cited for the first time in the present rejection, it appears the Office meant to indicate that the Declaration overcomes the Halliyal, et al. reference, to which it was directed.

Applicants also thank the Examiner for withdrawing the finality of the previous rejection. Applicants kindly submit that the finality of the present rejection is also improper. According to the M.P.E.P., "where the examiner introduces a new ground of rejection that is neither necessitated by applicant's amendment nor based on information submitted in an information disclosure statement filed during the period set forth in 37 C.F.R. 1.97(c) with the fee set forth in 37 C.F.R. 1.17(p)"¹, the Office Action may not be made final. This is precisely the situation in the present rejection.

First, the Office cites a new reference, Tanabe, et al., against the claims for the first time in this case. Upon review of the file, the Tanabe, et al. reference was not submitted in an information disclosure statement filed during the period set forth in 37 C.F.R. 1.97(c) with the fee set forth in 37 C.F.R. 1.17(p). The Tanabe, et al. reference was introduced by the Office only in the present rejection, and the finality of the rejection is believed to be clearly improper.

Second, the present rejection could not have been based on Applicants' previous amendments to the claims. The only amendments made in Applicants' previous response were: (1) to correct the dependencies of two dependent claims in accordance with the Examiner's request; and (2) to cancel the non-elected claims. The broad claims were not amended. These

¹M.P.E.P. § 706.07(a), Rev. 2, May 2004.

amendments could not have precipitated the present final rejection, and the finality of the rejection cannot be sustained on this ground.

Accordingly, the finality of the present rejection is premature, and Applicants kindly request that it be withdrawn.

Claims 1, 3, 5-12 and 19 stand rejected under 35 U.S.C. § 103(a) over JP2000-311928 (“Yasushi”) in view of Tanabe, et al. This rejection is traversed.

The Office recognizes that Yasushi fails to suggest nitriding a gate oxide layer with nitric oxide (NO) gas to form a nitrided gate oxide layer on the substrate. The Office relies on Tanabe, et al. to remedy this deficiency, asserting that Tanabe, et al. teaches “nitriding a gate oxide layer on a semiconductor substrate using nitric oxide gas to form the nitrided gate oxide layer on the substrate.”² The Office also asserts that it would be obvious to combine the references “because NO oxidation produces a higher amount of nitrogen incorporation at the Si/SiO₂ interface than does N₂O oxidation (i.e. - a higher amount of nitrogen incorporation at the Si/SiO₂ interface reduces dopant migration).”³

The Office’s reliance on Tanabe, et al. is misplaced. Tanabe, et al. does not support either proposition advanced by the Office. Tanabe, et al. does not teach “nitriding a gate oxide layer on a semiconductor substrate using nitric oxide gas to form the nitrided gate oxide layer”, and Tanabe, et al. does not teach that “NO oxidation produces a higher amount of nitrogen incorporation at the Si/SiO₂ interface than does N₂O oxidation”. Instead, Tanabe, et al. discloses only that an “oxidation and nitriding treatment” may be carried out with either nitric oxide (NO) or nitrous oxide (N₂O).⁴ Applicants kindly request the Office to point out precisely where in

² Office Action, page 3.

³ Office Action, page 3.

⁴ Tanabe et al paragraph [0159].

Tanabe, et al. the Office's assertions find support or withdraw them as grounds for rejection.

Even if one were motivated to combine the references, the cited references fail to provide any reasonable expectation of success. On the one hand, the claims require:

“nitriding a gate oxide layer on a semiconductor substrate using nitric oxide (NO) gas to form the nitrated gate oxide layer on the substrate; [and]
oxidizing the nitrated gate oxide layer on the substrate”

On the other hand, Tanabe, et al. teaches an “oxidizing and nitriding treatment” by “thermally treating the semiconductor substrate” in an NO or an N₂O atmosphere.⁵ The Office has not provided any explanation as to how or why Tanabe, et al.'s thermal “oxidizing and nitriding treatment” is the same as or somehow equivalent to the claimed nitriding to form a nitrated gate oxide layer and oxidizing the nitrated gate oxide layer. Indeed, Tanabe, et al.'s recitation of “oxidizing and nitriding” appears to be exactly the reverse of what is claimed. Tanabe, et al.'s recitation of “oxidizing and nitriding” is also exactly the reverse of what is disclosed in Yasushi. Applicants kindly submit that the combination of references advanced by the Office lacks any expectation of success, and the obviousness rejection should be withdrawn accordingly.

The Office's separate rejection of dependent Claims 8 and 11 over Yasushi and Tanabe, et al. cannot stand, since these claims depend from independent claims which themselves are not obvious over the same references, as discussed above. Contrary to what is advanced by the Office in the separate rejection, Applicants can find no teaching in Tanabe, et al. that the thickness is measured after a nitridation step. The rejection cannot be sustained on this ground.

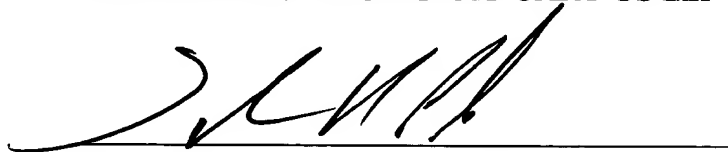
⁵ Tanabe et al paragraph [0159].

Dependent Claims 2 and 14-18 stand rejected for obviousness over Yasushi in view of Tanabe, et al. and further in view of "Silicon Processing for the VLSI Era" Volumes 1-3 to Wolf, et al. This rejection is travresed. Given that Wolf, et al. does not remedy the deficiencies of Yasushi and Tanabe, et al. as to the broad claims, the addition of Wolf, et al. cannot make the dependent claims obvious. This rejection should be withdrawn as unsustainable.

For the reasons given above, the rejections are unsustainable and should be withdrawn. Accordingly, this application remains in condition for allowance, and the Examiner is kindly requested to pass it to issue. If any issues remain which the Examiner feels may be best resolved through a personal or telephonic interview, however, the Examiner is respectfully requested to contact Applicants' counsel at the phone number listed below.

Respectfully submitted,

DLA PIPER RUDNICK GRAY CARY US LLP

A handwritten signature in black ink, appearing to read "S. Kelber", is written over a horizontal line.

Steven B. Kelber
Registration No. 30,073
Attorney of Record

1200 Nineteenth Street, N.W.
Washington, D.C. 20036-2412
Telephone No. (202) 861-3900
Facsimile No. (202) 223-2085

John K. Pike, Ph.D.
Registration No. 41,253